



TFT LCD Approval Specification

MODEL NO.: N133I6 - P0A

Customer:

Approved by:

Note:

| 核准時間 | 部門 | 審核 | 角色 | 投票 |
|------------------------|-------------|---|----------|--------|
| 2010-02-09 13:30:56 | NB 產品管理處 | <div>楊</div> <div>2010.02.09</div> <div>竣 傑</div> | Director | Accept |



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**CHI MEI**
OPTOELECTRONICS CORP.

Issued Date: Dec. 11, 2009

Model No.: N13316 - P0A

Approval**REVISION HISTORY**

| Version | Date | Page (New) | Section | Description |
|---------|-------------|---------------|---------|--|
| 2.0 | Dec, 11,'09 | All | All | Approval specification was first issued. |

1. GENERAL DESCRIPTION

1.1 OVERVIEW

N133I6 - P0A is a 13.3" TFT Liquid Crystal Display open cell with a 40 pins LVDS interface. This open cell supports 1280 x 800 WXGA mode and can display 262,144 colors. The optimum viewing angle is at 6 o'clock direction. The converter open cell for Backlight is built in.

1.2 FEATURES

- Thin and Light Weight
- WXGA (1280 x 800 pixels) resolution
- DE only mode
- 3.3V LVDS (Low Voltage Differential Signaling) interface with 1 pixel/clock

1.3 APPLICATION

- TFT LCD Notebook

1.4 GENERAL SPECIFICATIONS

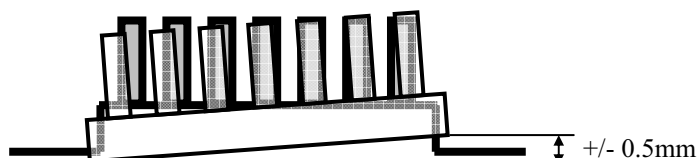
| Item | Specification | Unit | Note |
|--------------------|-------------------------|-------|------|
| Active Area | 286.08 (H) x 178.8 (V) | Mm | (1) |
| Top Polarizer Area | 289.48 (H) x 182.2 (V) | Mm | |
| Driver Element | a-si TFT active matrix | - | - |
| Pixel Number | 1280 x R.G.B. x 800 | pixel | - |
| Pixel Pitch | 0.2235 (H) x 0.2235 (V) | Mm | - |
| Pixel Arrangement | RGB vertical stripe | - | - |
| Display Colors | 262,144 | color | - |
| Transmissive Mode | Normally white | - | - |
| Surface Treatment | Anti Glare | - | - |

1.5 MECHANICAL SPECIFICATIONS

| Item | | Min. | Typ. | Max. | Unit | Note |
|-------------|---------------------------|--------|--------|--------|------|---------|
| Module Size | Horizontal (H) | 294.24 | 294.44 | 294.64 | mm | (1) (2) |
| | Vertical (V) With PCB | 200.9 | 201.9 | 202.9 | mm | |
| | Vertical (V) W/o PCB | 188.3 | 188.5 | 188.7 | mm | |
| | Thickness (T) With PCB | 3.45 | 3.6 | 3.75 | mm | |
| | Thickness (T) W/o PCB | 0.77 | 0.87 | 0.97 | mm | |
| Weight | | - | - | 175 | mm | |

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

Note (2) Connector mounting position



2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT

| Item | Symbol | Value | | Unit | Note |
|-------------------------------|-----------------|-------|------|------|----------|
| | | Min. | Max. | | |
| Storage Temperature | T _{ST} | -20 | +60 | °C | (1) |
| Operating Ambient Temperature | T _{OP} | 0 | +50 | °C | (1), (2) |

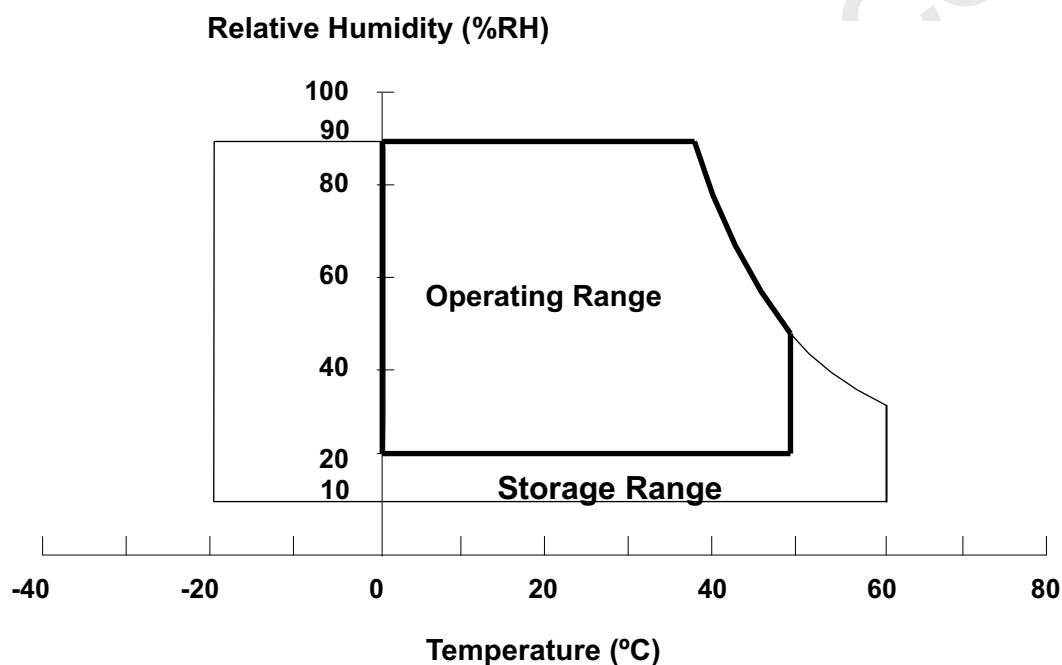
Note (1) Temperature and relative humidity range is shown in the figure below.

(a) 90 %RH Max. ($T_a \leq 40$ °C).

(b) Wet-bulb temperature should be 39 °C Max. ($T_a > 40$ °C).

(c) No condensation.

Note (2) The temperature of panel surface should be 0 °C Min. and 50 °C Max.



2.2 ABSOLUTE RATINGS OF ENVIRONMENT (OPEN CELL)

High temperature or humidity may reduce the performance of panel. Please store LCD panel within the specified storage conditions.

Storage Condition: With packing.

Storage temperature range: 25±5 °C.

Storage humidity range: 50±10%RH.

Shelf life: 30days



2.3 ELECTRICAL ABSOLUTE RATINGS

| Item | Symbol | Value | | Unit | Note |
|----------------------|----------|-------|--------------|------|------|
| | | Min. | Max. | | |
| Power Supply Voltage | V_{CC} | -0.3 | +4.0 | V | (1) |
| Logic Input Voltage | V_{IN} | -0.3 | $V_{CC}+0.3$ | V | |

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD OPEN CELL

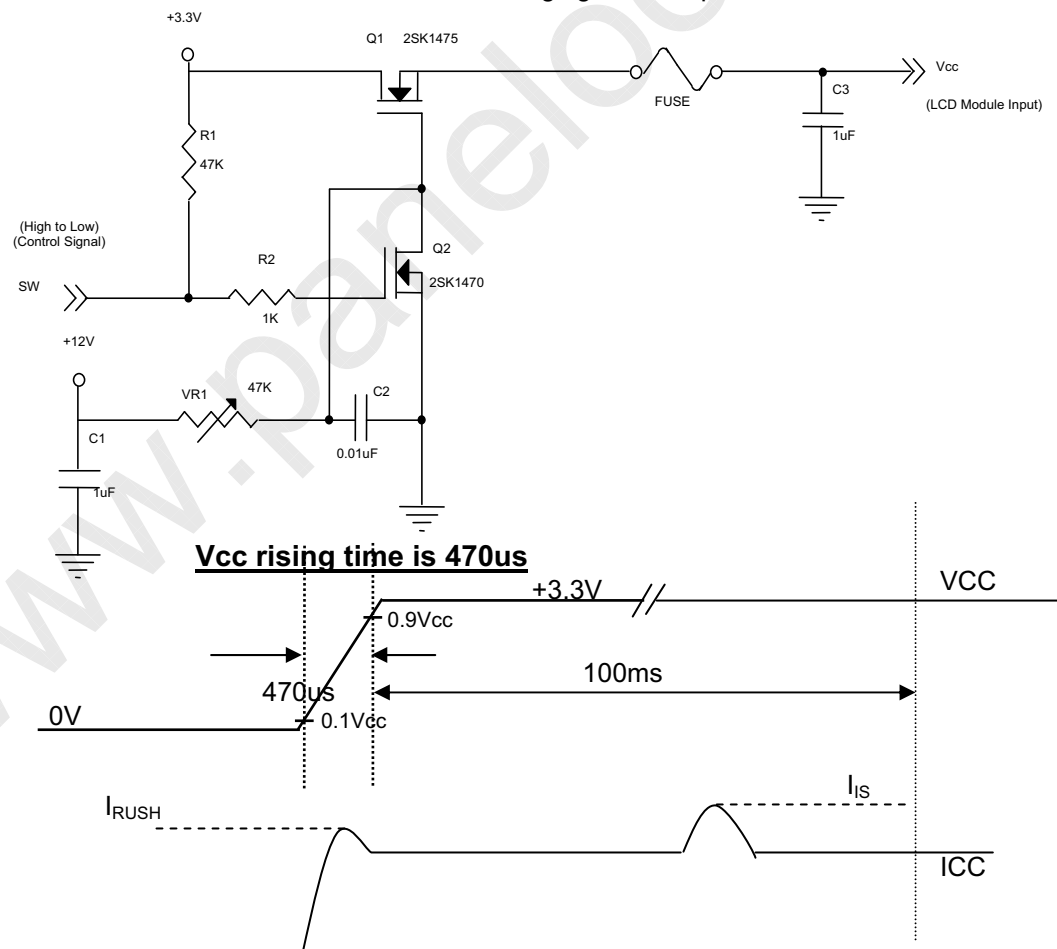
| Parameter | | Symbol | Value | | | Unit | Note |
|--|-------|-----------------------|-------|------|-------|------|-------------------------------|
| | | | Min. | Typ. | Max. | | |
| Power Supply Voltage | | V _{CC} | 3.0 | 3.3 | 3.6 | V | - |
| Permissible Ripple Voltage | | V _{RP} | - | 50 | - | mV | - |
| Rush Current | | I _{RUSH} | - | - | 1.5 | A | (2) |
| Initial Stage Current | | I _{IS} | - | - | 1.0 | A | (2) |
| Power Supply Current | White | I _{CC} | - | 200 | 230 | mA | (3)a |
| | Black | | - | 270 | 300 | mA | (3)b |
| LVDS Differential Input High Threshold | | V _{TH(LVDS)} | - | - | +100 | mV | (4), V _{CM} =1.2V |
| LVDS Differential Input Low Threshold | | V _{TL(LVDS)} | -100 | - | - | mV | (4) V _{CM} =1.2V |
| LVDS Common Mode Voltage | | V _{CM} | 1.125 | - | 1.375 | V | (4) |
| LVDS Differential Input Voltage | | V _{ID} | 100 | - | 600 | mV | (4) |
| Terminating Resistor | | R _T | - | 100 | - | Ohm | |

Note (1) The ambient temperature is Ta = 25 ± 2 °C.

Note (2) I_{RUSH}: the maximum current when VCC is rising

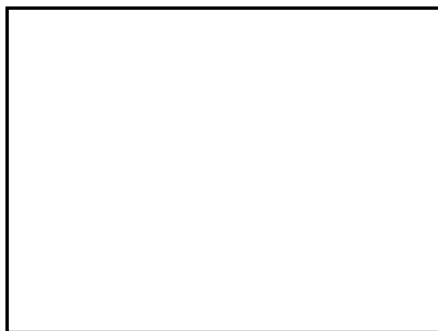
I_{IS}: the maximum current of the first 100ms after power-on

Measurement Conditions: Shown as the following figure. Test pattern: black.



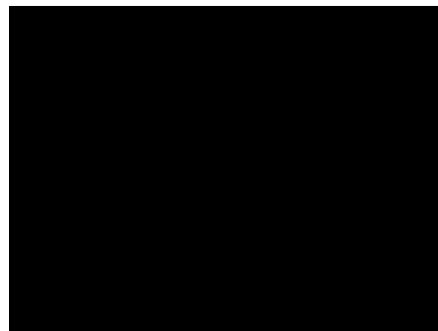
Note (3) The specified power supply current is under the conditions at $V_{CC} = 3.3\text{ V}$, $T_a = 25 \pm 2\text{ }^{\circ}\text{C}$, $f_v = 60\text{ Hz}$, whereas a power dissipation check pattern below is displayed.

a. White Pattern



Active Area

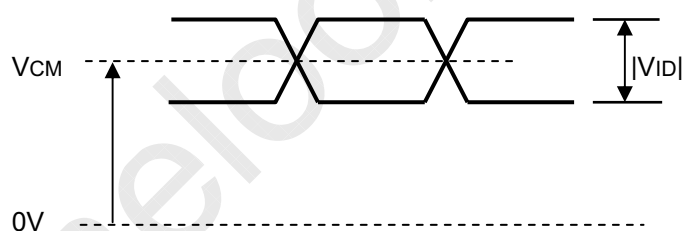
b. Black Pattern



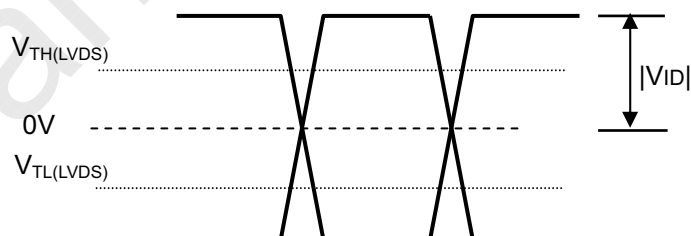
Active Area

Note (4) The parameters of LVDS signals are defined as the following figures.

Single Ended

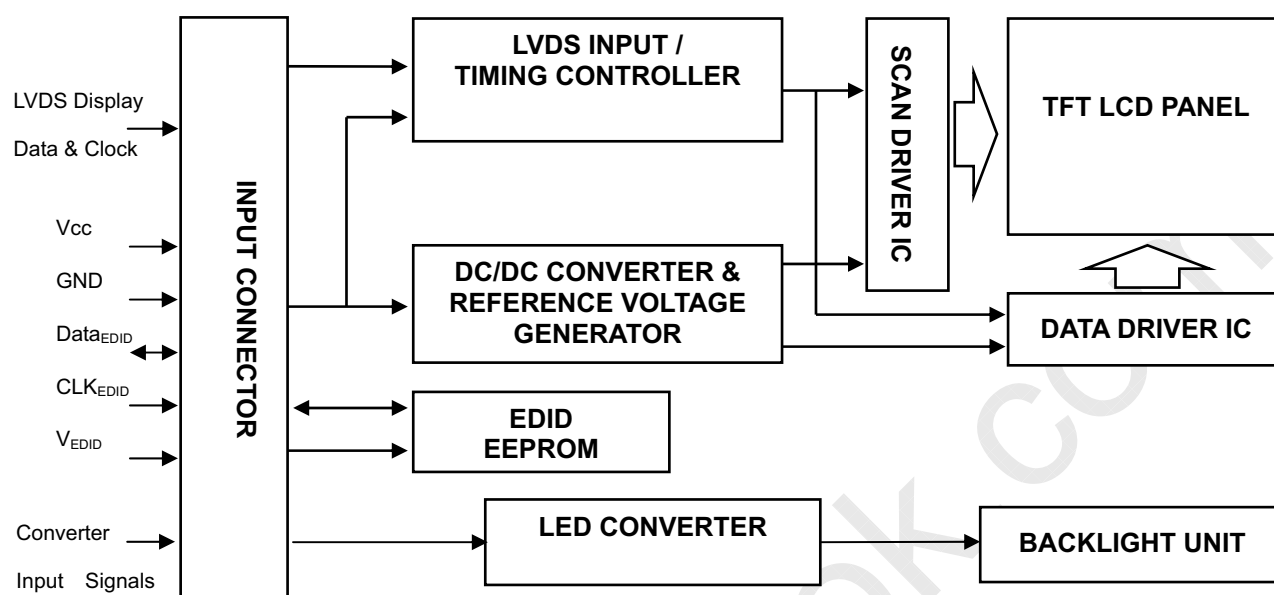


Differential



4. BLOCK DIAGRAM

4.1 TFT LCD OPEN CELL



5. INPUT TERMINAL PIN ASSIGNMENT

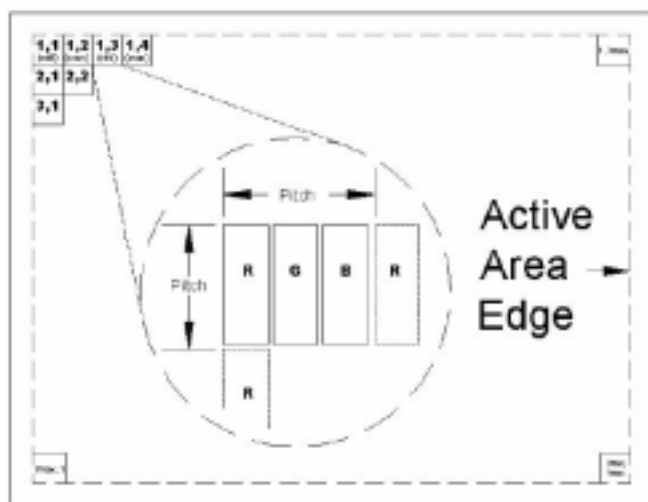
5.1 TFT LCD OPEN CELL

| Pin | Symbol | Description | Polarity | Remark |
|-----|-----------------|--|----------|-------------------------|
| 1 | VSS | Ground | | |
| 2 | NC | no connect | | |
| 3 | VDD | Logic power 3.3V | | |
| 4 | VDD | Logic power 3.3V | | |
| 5 | VDD | Logic power 3.3V | | |
| 6 | VEDID | EDID 3.3V power | | DDC 3.3V Power |
| 7 | NC | no connect | | |
| 8 | CLK | EDID clock | | DDC Clock |
| 9 | DATA | EDID data | | DDC Data |
| 10 | VSS | Ground | | |
| 11 | VSS | Ground | | |
| 12 | NC | no connect | | |
| 13 | RIN0- | - LVDS differential data input (R0-R5, G0) | Negative | R0~R5, G0 |
| 14 | RIN0+ | + LVDS differential data input (R0-R5, G0) | Positive | |
| 15 | VSS0 | Ground-LVDS0 | | |
| 16 | RIN1- | - LVDS differential data input (G1-G5, B0-B1) | Negative | G1~G5, B0, B1 |
| 17 | RIN1+ | + LVDS differential data input (G1-G5, B0-B1) | Positive | |
| 18 | VSS1 | Ground-LVDS1 | | |
| 19 | RIN2- | - LVDS differential data input (B2-B5, HS, VS, DE) | Negative | B2~B5, DE, Hsync, Vsync |
| 20 | RIN2+ | + LVDS differential data input (B2-B5, HS, VS, DE) | Positive | |
| 21 | VSS2 | Ground-LVDS2 | | |
| 22 | CLK- | - LVDS differential clock input | | LVDS Level Clock |
| 23 | CLK+ | + LVDS differential clock input | | |
| 24 | VSS3 | Ground-LVDS3 | | |
| 25 | INV_PWM / R_PWM | PWM brightness control | | |
| 26 | LED_Enable | Enable LED | | |
| 27 | VSS | LED Ground | | |
| 28 | VSS | LED Ground | | |
| 29 | VSS | LED Ground | | |
| 30 | VSS | LED Ground | | |
| 31 | NC | no connect | | |
| 32 | VBL+ | 7V - 20V LED power | | |
| 33 | VBL+ | 7V - 20V LED power | | |
| 34 | VBL+ | 7V - 20V LED power | | |
| 35 | VBL+ | 7V - 20V LED power | | |
| 36 | VBL+ | 7V - 20V LED power | | |
| 37 | NC | no connect | | |
| 38 | NC | no connect | | |
| 39 | NC | no connect | | |
| 40 | VSS | Ground | | |

Note (1) Connector Part No.: 20347- 140E-02(I-PEX) or equivalent

Note (2) User's connector Part No: 20345-040T-02 (I-PEX) or equivalent

Note (3) The first pixel is odd as shown in the following figure.

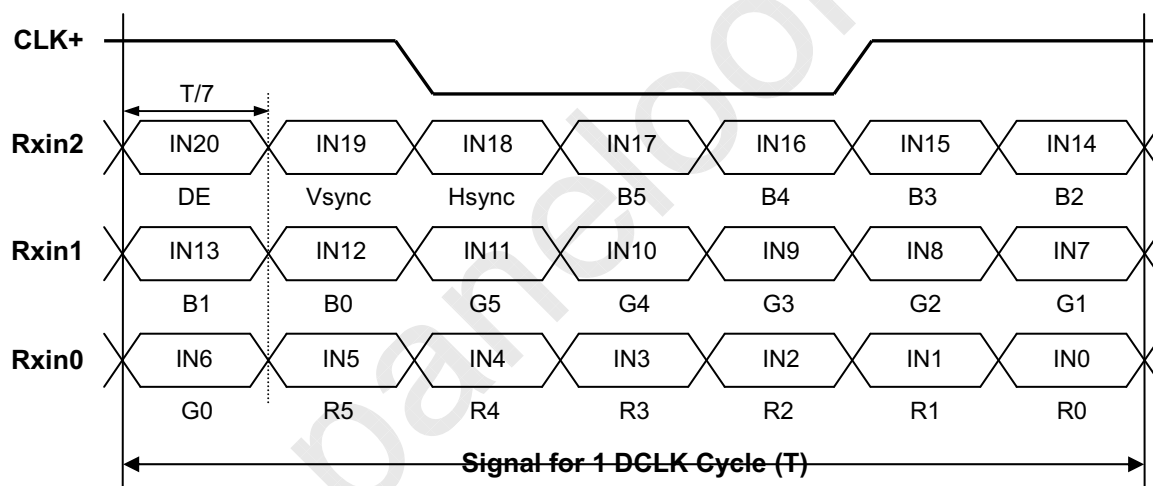


5.2 LED CONVERTER OUTPUT PIN ASSIGNMENT

| Pin | Symbol | Description |
|-----|--------|----------------------------------|
| 1 | CH1 | LED converter output voltage |
| 2 | CH2 | LED converter output voltage |
| 3 | CH3 | No connection |
| 4 | CH4 | LED converter feedback channel 1 |
| 5 | CH5 | LED converter feedback channel 2 |
| 6 | CH6 | LED converter feedback channel 3 |
| 7 | CH7 | LED converter feedback channel 4 |
| 8 | CH8 | LED converter feedback channel 5 |
| 9 | CH9 | LED converter feedback channel 6 |

Note (1) Connector Part No.: 59453-091110EDLF or equivalent

5.3 TIMING DIAGRAM OF LVDS INPUT SIGNAL



5.3 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 6-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

| Color | | Data Signal | | | | | | | | | | | | | | | | | |
|---------------------|---------------|-------------|----|----|----|----|----|-------|----|----|----|----|----|------|----|----|----|----|----|
| | | Red | | | | | | Green | | | | | | Blue | | | | | |
| | | R5 | R4 | R3 | R2 | R1 | R0 | G5 | G4 | G3 | G2 | G1 | G0 | B5 | B4 | B3 | B2 | B1 | B0 |
| Basic Colors | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Blue | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Cyan | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Magenta | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Yellow | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | White | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Gray Scale Of Red | Red(0)/Dark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red(1) | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red(2) | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | Red(61) | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red(62) | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red(63) | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gray Scale Of Green | Green(0)/Dark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green(1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green(2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | Green(61) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green(62) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green(63) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gray Scale Of Blue | Blue(0)/Dark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Blue(1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | Blue(2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | Blue(61) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 |
| | Blue(62) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| | Blue(63) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |

Note (1) 0: Low Level Voltage, 1: High Level Voltage



5.4 EDID DATA STRUCTURE

The EDID (Extended Display Identification Data) data formats are to support displays as defined in the VESA Plug & Display and FPD standards.

| Byte # (decimal) | Byte # (hex) | Field Name and Comments | Value (hex) | Value (binary) |
|---------------------|-----------------|---|----------------|-------------------|
| 0 | 0 | Header | 00 | 00000000 |
| 1 | 1 | Header | FF | 11111111 |
| 2 | 2 | Header | FF | 11111111 |
| 3 | 3 | Header | FF | 11111111 |
| 4 | 4 | Header | FF | 11111111 |
| 5 | 5 | Header | FF | 11111111 |
| 6 | 6 | Header | FF | 11111111 |
| 7 | 7 | Header | 00 | 00000000 |
| 8 | 8 | EISA ID manufacturer name ("CMO") | 0D | 00001101 |
| 9 | 9 | EISA ID manufacturer name (Compressed ASCII) | AF | 10101111 |
| 10 | 0A | ID product code (N133I6-L0A) | 13 | 00010011 |
| 11 | 0B | ID product code (hex LSB first; N133I6-L0A) | 13 | 00010011 |
| 12 | 0C | ID S/N (fixed "0") | 00 | 00000000 |
| 13 | 0D | ID S/N (fixed "0") | 00 | 00000000 |
| 14 | 0E | ID S/N (fixed "0") | 00 | 00000000 |
| 15 | 0F | ID S/N (fixed "0") | 00 | 00000000 |
| 16 | 10 | Week of manufacture (fixed week code) | 23 | 00100011 |
| 17 | 11 | Year of manufacture (fixed year code) | 12 | 00010010 |
| 18 | 12 | EDID structure version # ("1") | 01 | 00000001 |
| 19 | 13 | EDID revision # ("3") | 03 | 00000011 |
| 20 | 14 | Video I/P definition ("digital") | 80 | 10000000 |
| 21 | 15 | Active area horizontal 28.608cm | 1D | 00011101 |
| 22 | 16 | Active area vertical 17.88cm | 13 | 00010011 |
| 23 | 17 | Display Gamma (Gamma = "2.2") | 78 | 01111000 |
| 24 | 18 | Feature support ("Active off, RGB Color") | 0A | 00001010 |
| 25 | 19 | Red/Green (Rx1, Rx0, Ry1, Ry0, Gx1, Gx0, Gy1, Gy0) | 5C | 01011100 |
| 26 | 1A | Blue/White (Bx1, Bx0, By1, By0, Wx1, Wx0, Wy1, Wy0) | 80 | 10000000 |
| 27 | 1B | Red-x (Rx = "0.622") | 98 | 10011000 |
| 28 | 1C | Red-y (Ry = "0.346") | 58 | 01011000 |
| 29 | 1D | Green-x (Gx = "0.333") | 51 | 01010001 |
| 30 | 1E | Green-y (Gy = "0.528") | 8E | 10001110 |
| 31 | 1F | Blue-x (Bx = "0.164") | 27 | 00100111 |
| 32 | 20 | Blue-y (By = "0.162") | 25 | 00100101 |
| 33 | 21 | White-x (Wx = "0.313") | 50 | 01010000 |
| 34 | 22 | White-y (Wy = "0.329") | 54 | 01010100 |
| 35 | 23 | Established timings 1 | 00 | 00000000 |
| 36 | 24 | Established timings 2 | 00 | 00000000 |
| 37 | 25 | Manufacturer's reserved timings | 00 | 00000000 |
| 38 | 26 | Standard timing ID # 1 | 01 | 00000001 |
| 39 | 27 | Standard timing ID # 1 | 01 | 00000001 |

| | | | | |
|----|----|--|----|----------|
| 40 | 28 | Standard timing ID # 2 | 01 | 00000001 |
| 41 | 29 | Standard timing ID # 2 | 01 | 00000001 |
| 42 | 2A | Standard timing ID # 3 | 01 | 00000001 |
| 43 | 2B | Standard timing ID # 3 | 01 | 00000001 |
| 44 | 2C | Standard timing ID # 4 | 01 | 00000001 |
| 45 | 2D | Standard timing ID # 4 | 01 | 00000001 |
| 46 | 2E | Standard timing ID # 5 | 01 | 00000001 |
| 47 | 2F | Standard timing ID # 5 | 01 | 00000001 |
| 48 | 30 | Standard timing ID # 6 | 01 | 00000001 |
| 49 | 31 | Standard timing ID # 6 | 01 | 00000001 |
| 50 | 32 | Standard timing ID # 7 | 01 | 00000001 |
| 51 | 33 | Standard timing ID # 7 | 01 | 00000001 |
| 52 | 34 | Standard timing ID # 8 | 01 | 00000001 |
| 53 | 35 | Standard timing ID # 8 | 01 | 00000001 |
| 54 | 36 | Detailed timing description # 1 Pixel clock ("71MHz", According to VESA CVT Rev1.1) | BC | 10111100 |
| 55 | 37 | # 1 Pixel clock (hex LSB first) | 1B | 00011011 |
| 56 | 38 | # 1 H active ("1280") | 00 | 00000000 |
| 57 | 39 | # 1 H blank ("160") | A0 | 10100000 |
| 58 | 3A | # 1 H active : H blank ("1280 : 160") | 50 | 01010000 |
| 59 | 3B | # 1 V active ("800") | 20 | 00100000 |
| 60 | 3C | # 1 V blank ("23") | 17 | 00010111 |
| 61 | 3D | # 1 V active : V blank ("800 : 23") | 30 | 00110000 |
| 62 | 3E | # 1 H sync offset ("48") | 30 | 00110000 |
| 63 | 3F | # 1 H sync pulse width ("32") | 20 | 00100000 |
| 64 | 40 | # 1 V sync offset : V sync pulse width ("3 : 6") | 36 | 00110110 |
| 65 | 41 | # 1 H sync offset : H sync pulse width : V sync offset : V sync width ("48: 32 : 3 : 6") | 00 | 00000000 |
| 66 | 42 | # 1 H image size ("286 mm") | 1E | 00011110 |
| 67 | 43 | # 1 V image size ("179 mm") | B3 | 10110011 |
| 68 | 44 | # 1 H image size : V image size ("286 : 179") | 10 | 00010000 |
| 69 | 45 | # 1 H boarder ("0") | 00 | 00000000 |
| 70 | 46 | # 1 V boarder ("0") | 00 | 00000000 |
| 71 | 47 | # 1 Non-interlaced, Normal, no stereo, Separate sync, H/V pol Negatives | 19 | 00011001 |
| 72 | 48 | Detailed timing description # 2 | 00 | 00000000 |
| 73 | 49 | # 2 Flag | 00 | 00000000 |
| 74 | 4A | # 2 Reserved | 00 | 00000000 |
| 75 | 4B | # 2 FE (hex) defines ASCII string (Model Name "N133I6-L0A", ASCII) | FE | 11111110 |
| 76 | 4C | # 2 Flag | 00 | 00000000 |
| 77 | 4D | # 2 1st character of name ("N") | 4E | 01001110 |
| 78 | 4E | # 2 2nd character of name ("1") | 31 | 00110001 |
| 79 | 4F | # 2 3rd character of name ("3") | 33 | 00110011 |
| 80 | 50 | # 2 4th character of name ("3") | 33 | 00110011 |
| 81 | 51 | # 2 5th character of name ("I") | 49 | 01001001 |
| 82 | 52 | # 2 6th character of name ("6") | 36 | 00110110 |
| 83 | 53 | # 2 7th character of name ("-") | 2D | 00101101 |
| 84 | 54 | # 2 8th character of name ("L") | 4C | 01001100 |



| | | | | |
|-----|----|---|----|----------|
| 85 | 55 | # 2 9th character of name ("0") | 30 | 00110000 |
| 86 | 56 | # 2 9th character of name ("A") | 41 | 01000001 |
| 87 | 57 | # 2 New line character indicates end of ASCII string | 0A | 00001010 |
| 88 | 58 | # 2 Padding with "Blank" character | 20 | 00100000 |
| 89 | 59 | # 2 Padding with "Blank" character | 20 | 00100000 |
| 90 | 5A | Detailed timing description # 3 | 00 | 00000000 |
| 91 | 5B | # 3 Flag | 00 | 00000000 |
| 92 | 5C | # 3 Reserved | 00 | 00000000 |
| 93 | 5D | # 3 FE (hex) defines ASCII string (Vendor "CMO", ASCII) | FE | 11111110 |
| 94 | 5E | # 3 Flag | 00 | 00000000 |
| 95 | 5F | # 3 1st character of string ("C") | 43 | 01000011 |
| 96 | 60 | # 3 2nd character of string ("M") | 4D | 01001101 |
| 97 | 61 | # 3 3rd character of string ("O") | 4F | 01001111 |
| 98 | 62 | # 3 New line character indicates end of ASCII string | 0A | 00001010 |
| 99 | 63 | # 3 Padding with "Blank" character | 20 | 00100000 |
| 100 | 64 | # 3 Padding with "Blank" character | 20 | 00100000 |
| 101 | 65 | # 3 Padding with "Blank" character | 20 | 00100000 |
| 102 | 66 | # 3 Padding with "Blank" character | 20 | 00100000 |
| 103 | 67 | # 3 Padding with "Blank" character | 20 | 00100000 |
| 104 | 68 | # 3 Padding with "Blank" character | 20 | 00100000 |
| 105 | 69 | # 3 Padding with "Blank" character | 20 | 00100000 |
| 106 | 6A | # 3 Padding with "Blank" character | 20 | 00100000 |
| 107 | 6B | # 3 Padding with "Blank" character | 20 | 00100000 |
| 108 | 6C | Detailed timing description # 4 | 00 | 00000000 |
| 109 | 6D | # 4 Flag | 00 | 00000000 |
| 110 | 6E | # 4 Reserved | 00 | 00000000 |
| 111 | 6F | # 4 FE (hex) defines ASCII string (Model Name"N133I6-L0A", ASCII) | FE | 11111110 |
| 112 | 70 | # 4 Flag | 00 | 00000000 |
| 113 | 71 | # 4 1st character of name ("N") | 4E | 01001110 |
| 114 | 72 | # 4 2nd character of name ("1") | 31 | 00110001 |
| 115 | 73 | # 4 3rd character of name ("3") | 33 | 00110011 |
| 116 | 74 | # 4 4th character of name ("3") | 33 | 00110011 |
| 117 | 75 | # 4 5th character of name ("I") | 49 | 01001001 |
| 118 | 76 | # 4 6th character of name ("6") | 36 | 00110110 |
| 119 | 77 | # 4 7th character of name ("-") | 2D | 00101101 |
| 120 | 78 | # 4 8th character of name ("L") | 4C | 01001100 |
| 121 | 79 | # 4 9th character of name ("0") | 30 | 00110000 |
| 122 | 7A | # 4 9th character of name ("A") | 41 | 01000001 |
| 123 | 7B | # 4 New line character indicates end of ASCII string | 0A | 00001010 |
| 124 | 7C | # 4 Padding with "Blank" character | 20 | 00100000 |
| 125 | 7D | # 4 Padding with "Blank" character | 20 | 00100000 |
| 126 | 7E | Extension flag | 00 | 00000000 |
| 127 | 7F | Checksum | 2D | 00101101 |

6 CONVERTER SPECIFICATION

6.1 ABSOLUTE MAXIMUM RATINGS

| Symbol | Ratings |
|-----------------|------------|
| V _{in} | 40.0V |
| Gnd | +/-0.3V |
| PWM, EN | -0.3V~6.0V |

6.2 RECOMMENDED OPERATING RATINGS

| Parameter | Symbol | Value | | | Unit | Note |
|--------------------------------------|----------------------|-------|------|------|------|------|
| | | Min. | Typ. | Max. | | |
| Converter Input power supply voltage | V _{in} | 7.0 | 12.0 | 21.0 | V | |
| EN Control Level | Backlight on | 2.0 | --- | 5.5 | V | |
| | Backlight off | 0 | --- | 0.8 | V | |
| PWM Control Level | PWM High Level | 2.0 | --- | 5.5 | V | |
| | PWM Low Level | 0 | --- | 0.8 | V | |
| PWM Control Duty Ratio | | 20 | | 100 | % | |
| PWM Control Frequency | f _{PWM} | 180 | 200 | 220 | Hz | |
| Converter Input Current | V _{in} =7 V | | 600 | 650 | mA | (1) |
| | V _{in} =21V | | 200 | 220 | mA | (2) |

Note (1) The specified LED power supply current is under the conditions at V_{in} = 7 V, T_a = 25 ± 2 °C, f_{PWM} = 200 Hz, Duty=100%.

Note (2) The specified LED power supply current is under the conditions at V_{in} = 21V, T_a = 25 ± 2 °C, f_{PWM} = 200 Hz, Duty=100%.

7. INTERFACE TIMING

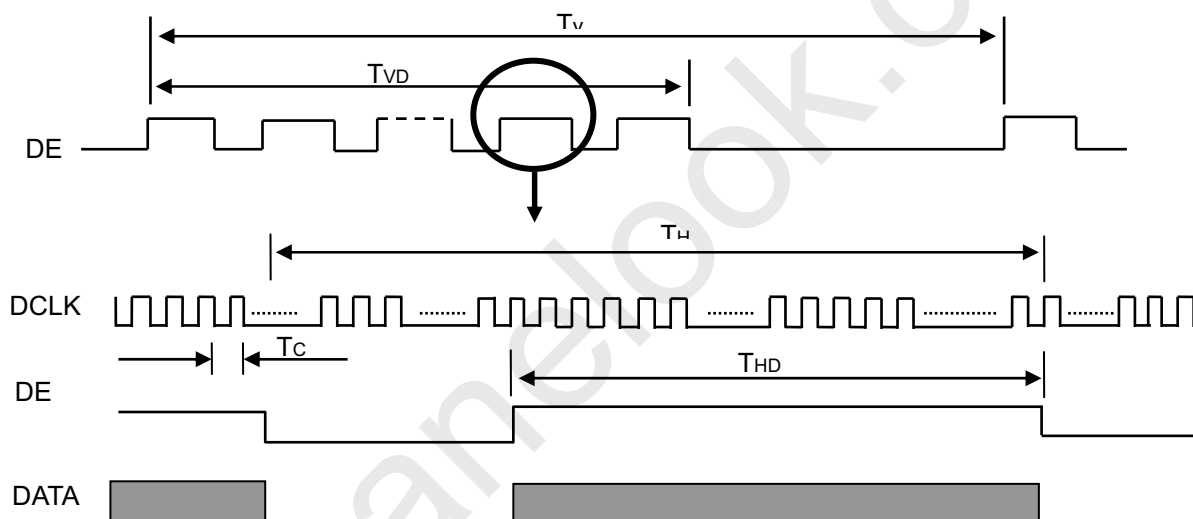
7.1 INPUT SIGNAL TIMING SPECIFICATIONS

The specifications of input signal timing are as the following table and timing diagram.

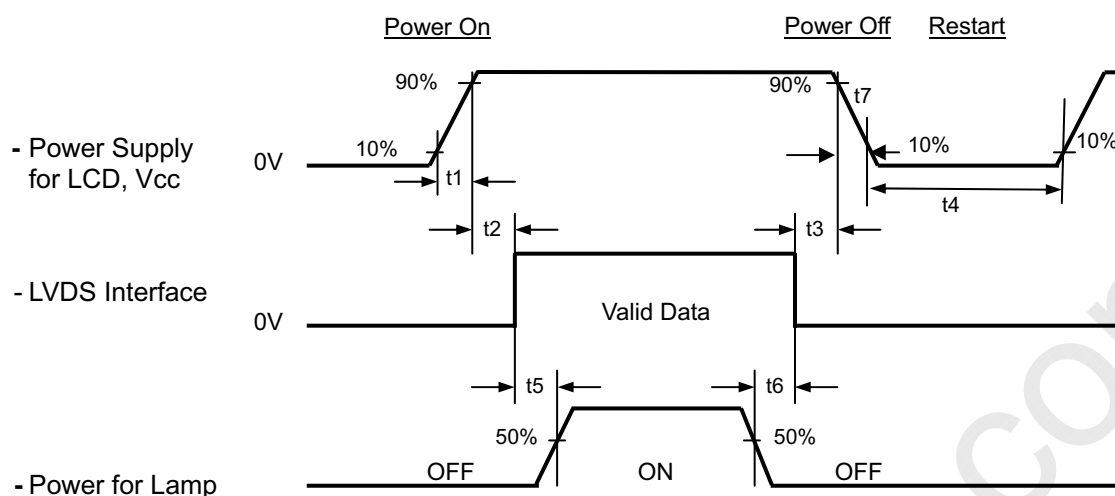
| Signal | Item | Symbol | Min. | Typ. | Max. | Unit | Note |
|--------|-----------------------------------|--------|--------|------|--------|------|------|
| DCLK | Frequency | 1/Tc | 50 | 71 | 80 | MHz | - |
| DE | Vertical Total Time | TV | 803 | 823 | 1028 | TH | - |
| | Vertical Addressing Time | TVD | 800 | 800 | 800 | TH | - |
| | Vertical Active Blanking Period | TVB | TV-TVD | 23 | TV-TVD | TH | - |
| | Horizontal Total Time | TH | 1362 | 1440 | 1800 | Tc | - |
| | Horizontal Addressing Time | THD | 1280 | 1280 | 1280 | Tc | - |
| | Horizontal Active Blanking Period | THB | TH-THD | 160 | TH-THD | Tc | - |

Note (1) Because this open cell is operated by DE only mode, Hsync and Vsync are ignored.

INPUT SIGNAL TIMING DIAGRAM



7.2 POWER ON/OFF SEQUENCE



Timing Specifications:

$$0.5 \leq t1 \leq 10 \text{ ms}$$

$$0 \leq t2 \leq 50 \text{ ms}$$

$$0 \leq t3 \leq 50 \text{ ms}$$

$$t4 \geq 500 \text{ ms}$$

$$t5 \geq 200 \text{ ms}$$

$$t6 \geq 200 \text{ ms}$$

Note (1) Please follow the power on/off sequence described above. Otherwise, the LCD open cell might be damaged.

Note (2) Please avoid floating state of interface signal at invalid period. When the interface signal is invalid, be sure to pull down the power supply of LCD Vcc to 0 V.

Note (3) The Backlight converter power must be turned on after the power supply for the logic and the interface signal is valid. The Backlight converter power must be turned off before the power supply for the logic and the interface signal is invalid.

Note (4) Sometimes some slight noise shows when LCD is turned off (even backlight is already off). To avoid this phenomenon, we suggest that the Vcc falling time is better to follow $5 \leq t7 \leq 300 \text{ ms}$.

8 OPTICAL CHARACTERISTICS

8.1 TEST CONDITIONS

| Item | Symbol | Value | Unit |
|---------------------|---|-------|------|
| Ambient Temperature | Ta | 25±2 | °C |
| Ambient Humidity | Ha | 50±10 | %RH |
| Supply Voltage | V _{CC} | 3.4 | V |
| Input Signal | According to typical value in "3. ELECTRICAL CHARACTERISTICS" | | |

8.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown as below. The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (6).

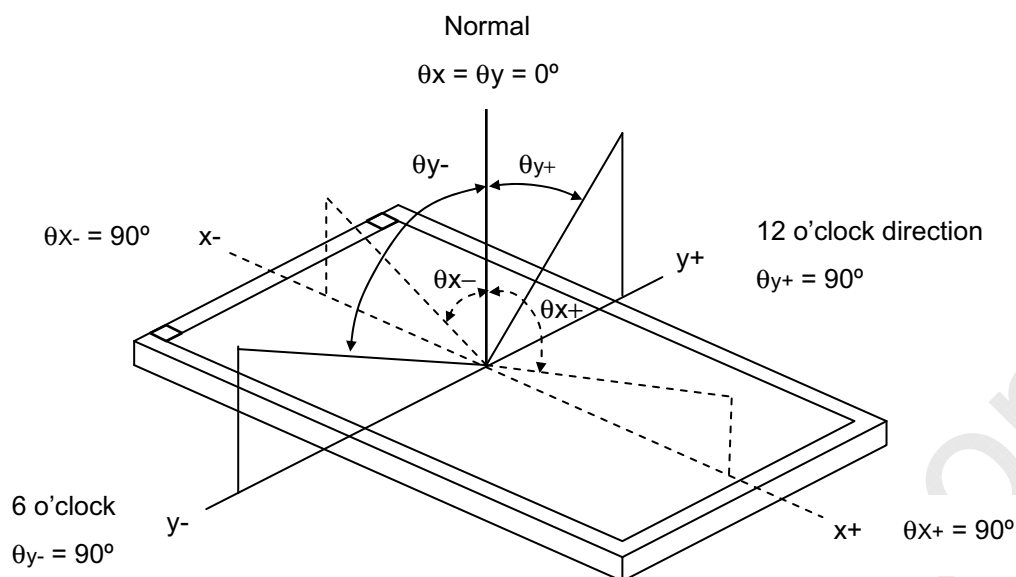
| Item | | Symbol | Condition | Min. | Typ. | Max. | Unit | Note |
|--------------------------|------------|-----------------|---|------------|-------|------------|------|-----------------|
| Color Chromaticity | Red | Rcx | $\theta_x=0^\circ, \theta_y=0^\circ$ CS-2000T Standard light source “C” | Typ - 0.05 | 0.601 | Typ + 0.05 | - | (0),(6) |
| | | Rcy | | | 0.329 | | - | |
| | Green | Gcx | | | 0.286 | | - | |
| | | Gcy | | | 0.547 | | - | |
| | Blue | Bcx | | | 0.141 | | - | |
| | | Bcy | | | 0.176 | | - | |
| | White | Wcx | | | 0.303 | | - | |
| | | Wcy | | | 0.350 | | - | |
| Center Transmittance | | T% | $\theta_x=0^\circ, \theta_y=0^\circ$ | 5.6 | 7 | - | | (1), (8) |
| Contrast Ratio | | CR | CS-2000T, CMO BLU | 200 | 300 | - | - | (1), (3) |
| Response Time | | T _R | $\theta_x=0^\circ, \theta_y=0^\circ$ | - | 5 | 10 | ms | (4) |
| | | T _F | | - | 11 | 16 | ms | |
| Transmittance uniformity | | δT% | $\theta_x=0^\circ, \theta_y=0^\circ$ BM-5A | 80 | 90 | - | - | (1), (7) |
| Viewing Angle | Horizontal | θ _{x+} | CR≥10 BM-5A | 40 | 45 | - | Deg. | (1), (3) (6) |
| | | θ _{x-} | | 40 | 45 | - | | |
| | Vertical | θ _{y+} | | 15 | 20 | - | | |
| | | θ _{y-} | | 40 | 45 | - | | |

Note (0) Light source is the standard light source "C" which is defined by CIE and driving voltages are based on suitable gamma voltages. The calculating method is as following :

1. Measure Module's and BLU's spectrums. White is without signal input and R, G, B are with signal input. BLU is supplied by CMO.
2. Calculate cell's spectrum.
3. Calculate cell's chromaticity by using the spectrum of standard light source "C"

Note (1) Light source is the BLU which is supplied by CMO and driving voltages are based on suitable gamma voltages. White is without signal input and R, G, B are with signal input. SPEC is judged by CMO's golden sample.

Note (2) Definition of Viewing Angle (θ_x, θ_y):



Note (3) Definition of Contrast Ratio (CR):

$$CR_{AVE} = [CR(1) + CR(2) + CR(3) + CR(4) + CR(5)] / 5$$

CR_{max} = Max value of CR at whole Viewing Angle

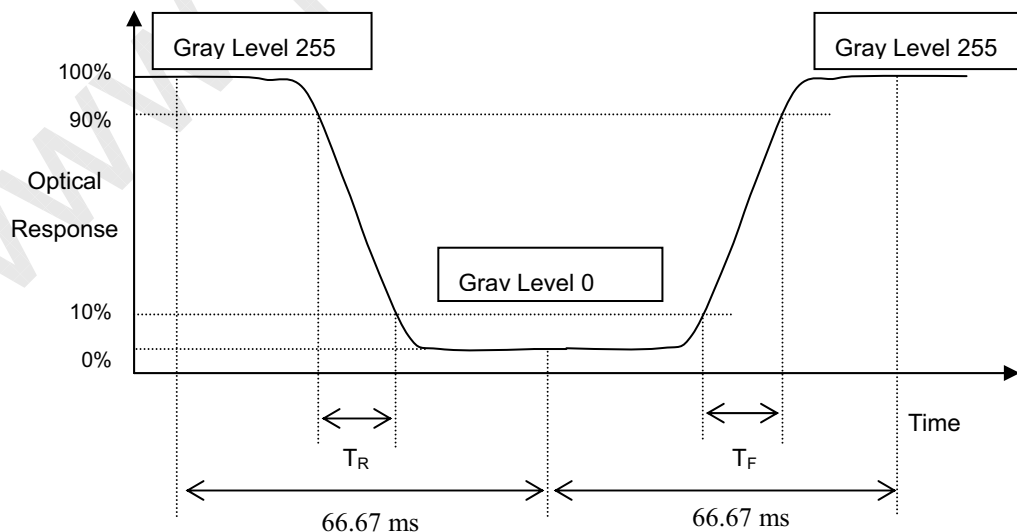
CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (6).

$$CR = \frac{\text{Luminance with all pixel white (Gmax)}}{\text{Luminance with all pixel black (Gmin)}}$$

Gmax: Luminance of gray max at the center point of panel.

Gmin: Luminance of gray min at the center point of panel.

Note (4) Definition of Response Time (T_R , T_F):



Note (5) Definition of Luminance of White (L_C):

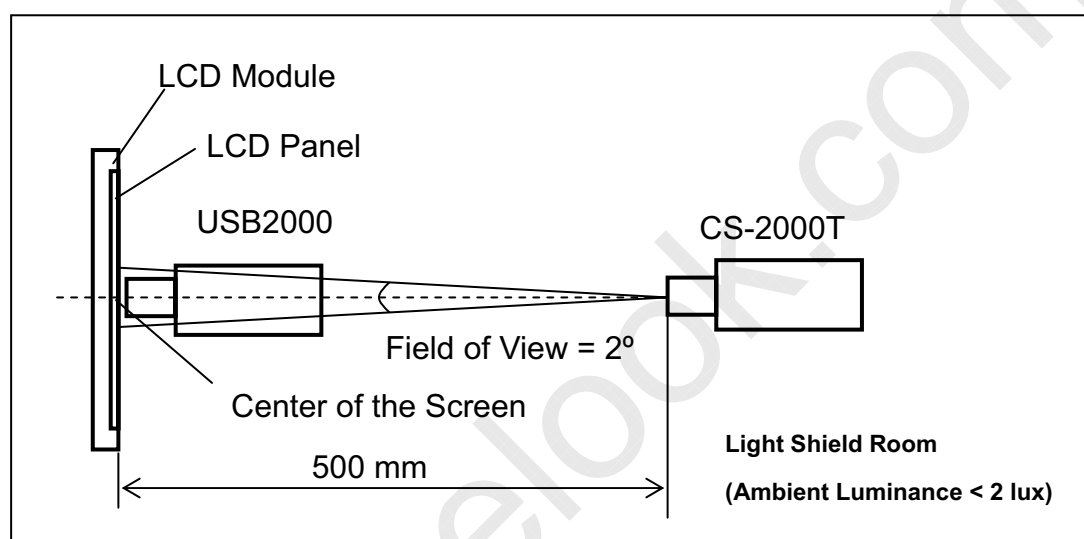
Measure the luminance of gray level 255 at center point

$$L_C = L(5)$$

$L(x)$ is corresponding to the luminance of the point X at Figure in Note (7).

Note (6) Measurement Setup:

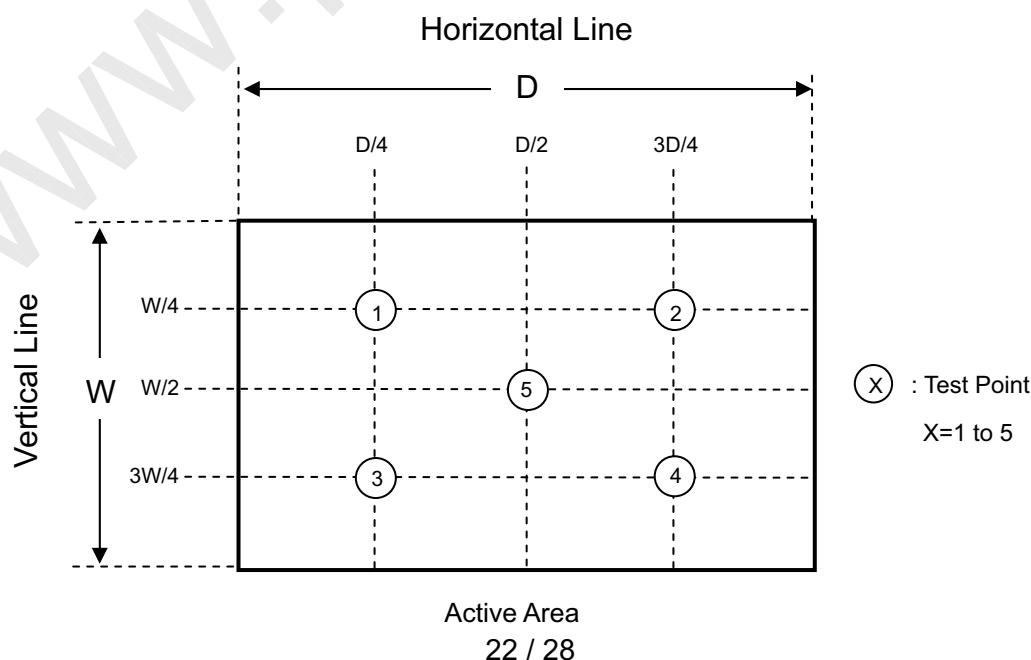
The LCD module should be stabilized at given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



Note (7) Definition of Transmittance Variation ($\delta T\%$):

Measure the transmittance at 5 points

$$\delta T\% = \frac{\text{Minimum } [T\%(1), T\%(2), \dots T\%(5)]}{\text{Maximum } [T\%(1), T\%(2), \dots T\%(5)]}$$



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Model No.: N133I6 - P0A

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Note (8) Definition of Transmittance (T%):

Module is without signal input.

BLU is supplied by CMO.

$$\text{Transmittance} = \frac{\text{Luminance of LCD module}}{\text{Luminance of backlight}} * 100\%$$

9. PRECAUTIONS

9.1 ASSEMBLY AND HANDLING PRECAUTIONS

- (1) Do not apply rough force such as bending or twisting to the open cell during assembly.
- (2) To assemble or install open cell into user's system can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- (3) It's not permitted to have pressure or impulse on the open cell because the LCD panel and Backlight will be damaged.
- (4) Always follow the correct power sequence when LCD open cell is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.
- (5) Do not pull the I/F connector in or out while the open cell is operating.
- (6) Do not disassemble the open cell.
- (7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- (8) It is dangerous that moisture come into or contacted the LCD open cell, because moisture may damage LCD open cell when it is operating.
- (9) High temperature or humidity may reduce the performance of open cell. Please store LCD open cell within the specified storage conditions.
- (10) When ambient temperature is lower than 10°C may reduce the display quality. For example, the response time will become slowly, and the starting voltage of CCFL will be higher than room temperature.

9.2 SAFETY PRECAUTIONS

- (1) The startup voltage of Backlight is approximately 1000 Volts. It may cause electrical shock while assembling with converter. Do not disassemble the open cell or insert anything into the Backlight unit.
- (2) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- (3) After the open cell's end of life, it is not harmful in case of normal operation and storage.

9.3 OPERATION PRECAUTIONS

- (1) Do not pull the I/F connector in or out while the open cell is operating.
- (2) Always follow the correct power on/off sequence when LCD open cell is connecting and operating. This can prevent the CMOS LSI chips from damage during latch-up.

10. PACKAGING

10.1 PACKING SPECIFICATIONS

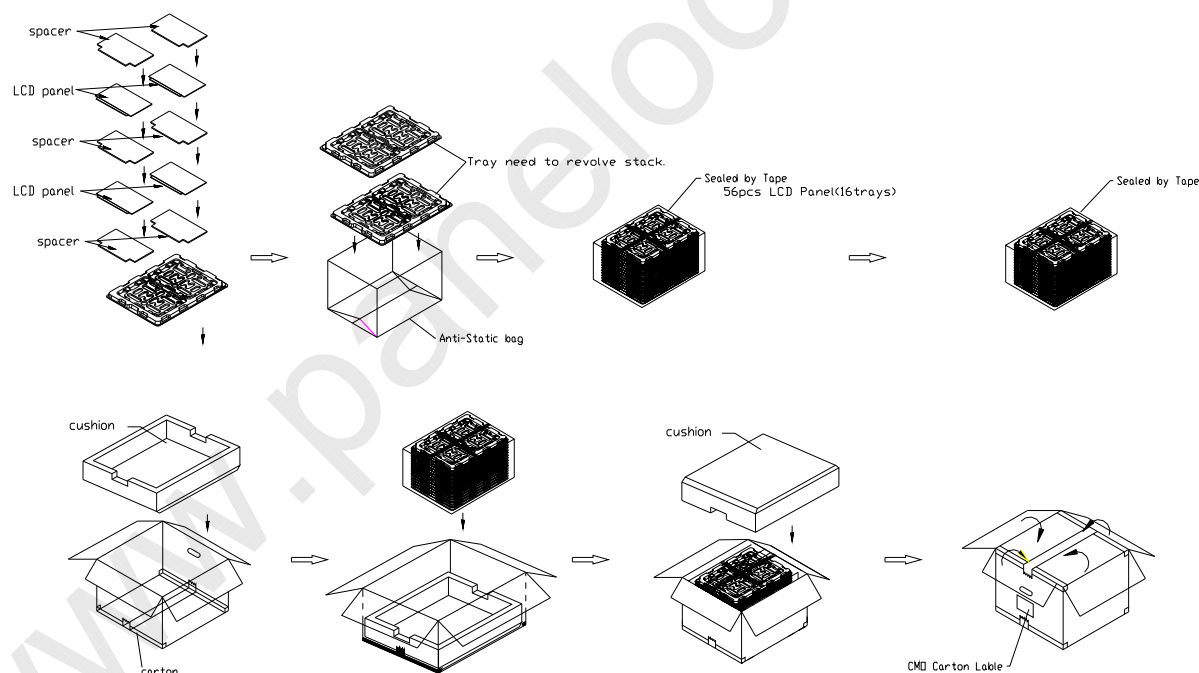
- (1) 56 open cells / 1 Box
- (2) Box dimensions: 650mm(L) X 495mm(W) X 320mm(H)
- (3) Weight: approximately 12.3Kg (56 open cells per box)

10.2 PACKING METHOD

- (1) Carton Packing should have no failure in the following reliability test items

| Test Item | Test Conditions | Note |
|-------------------|--|---------------|
| Packing Vibration | ISTA STANDARD Random, Frequency Range: 1 – 200 Hz Top & Bottom: 30 minutes (+Z), 10 min (-Z), Right & Left: 10 minutes (X) Back & Forth 10 minutes (Y) | Non Operation |

- (2) Packing method.



- (1) Carton Dimensions: 650(L)x495(W)x320(H)mm
- (2) 56 LCD Cells+PCB/Carton

10.2 Pallet:



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Model No.: N13316 - P0A

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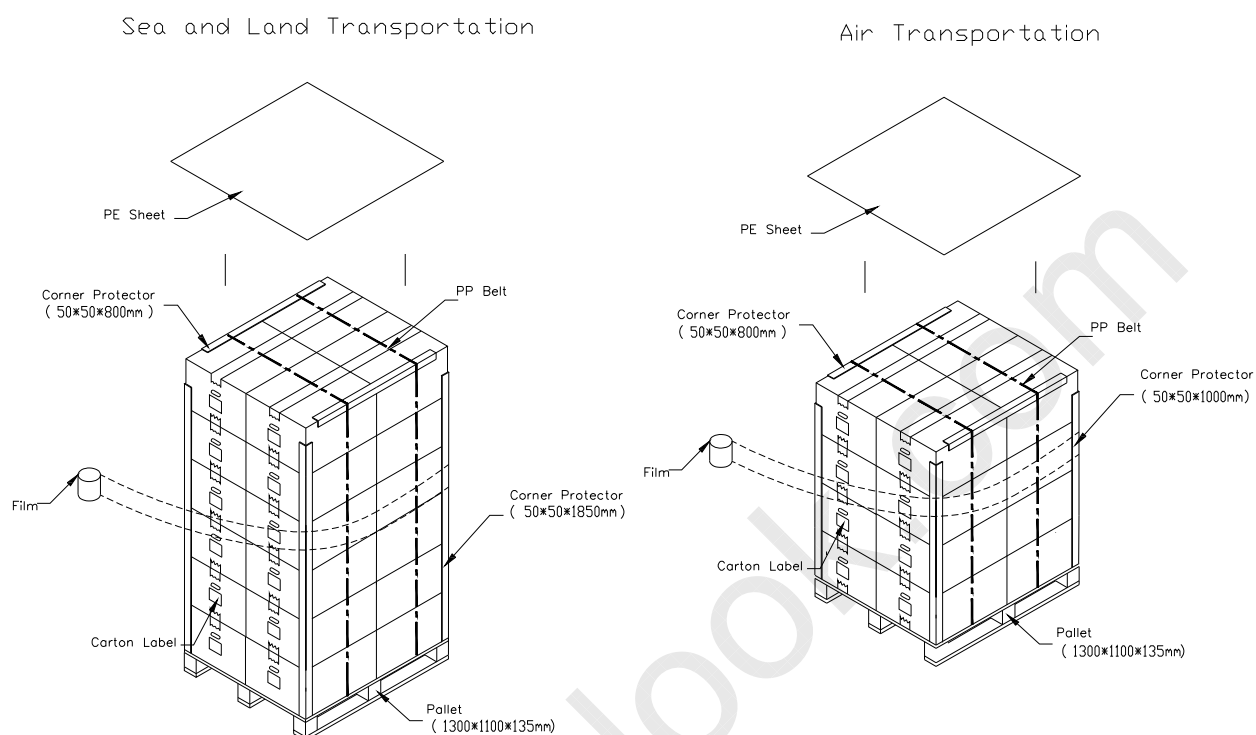


Figure. 10-2 Packing method

11. DEFINITION OF LABELS

11.1 CMO CARTON LABEL

The barcode nameplate is pasted on each box as illustration, and its definitions are as following explanation

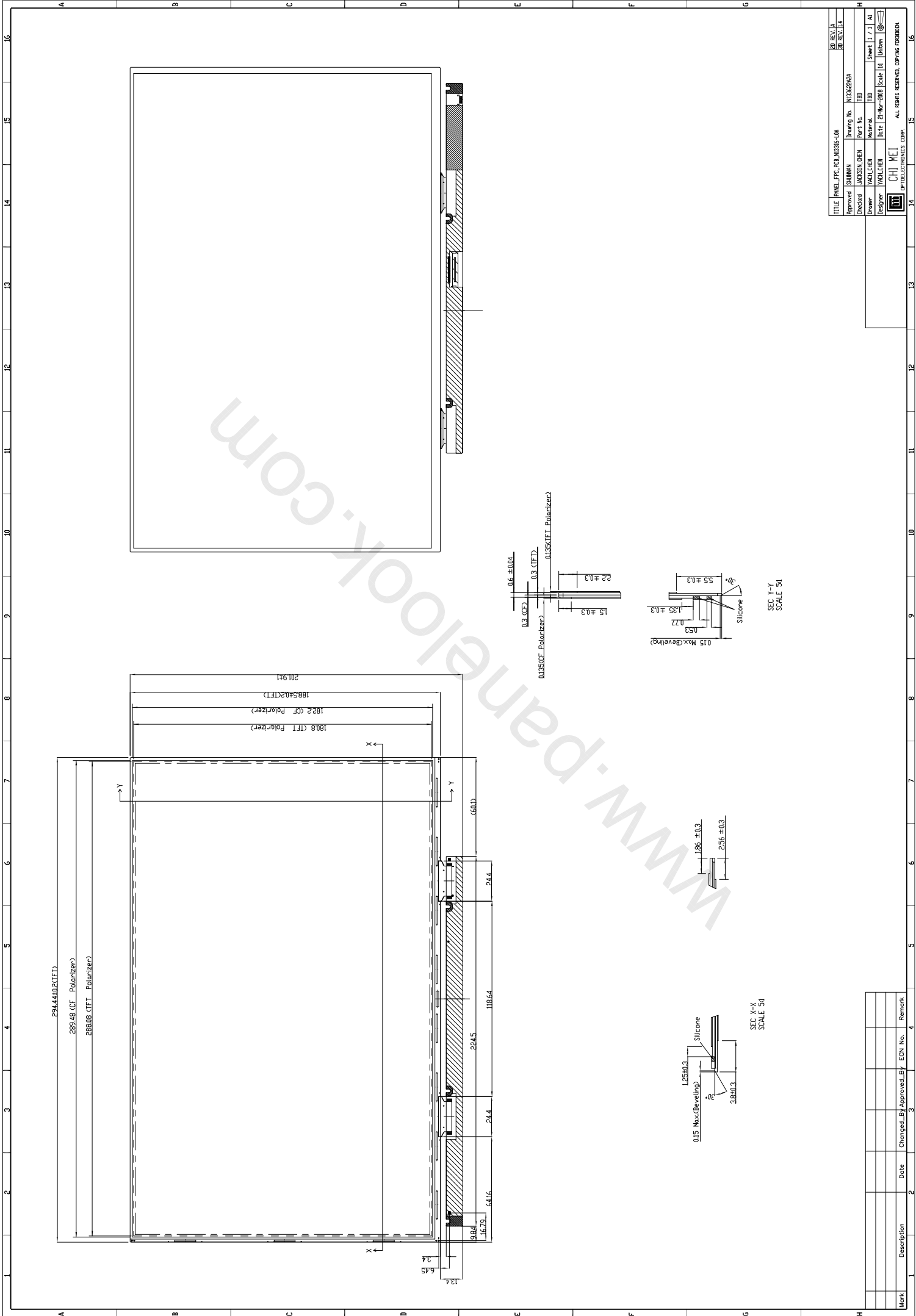
- (a) Model Name: N133I6 -P0A
- (b) Carton ID: CMO internal control
- (c) Quantities: 56



The illustration shows a CMO Carton Label with the following fields and values:

- PO.NO: _____
- Part ID: _____
- Model Name: **N133I6 -P0A**
- Carton ID:  **XXXXXXXXXXXXXX**
- Quantities: **56**

The label also features the CHI MEI OPTOELECTRONICS logo and the text "RoHS" in the top right corner.



| | | | | | | | |
|----------|--|------------------------|--|-----------------------|--|--|--|
| TITLE | | PANEL FPC PCB N1336-0A | | 2D REV. 1.0 | | 3D REV. 1.0 | |
| Approved | | SHAWN | | Drawing No. | | N1336-00A | |
| Decided | | JACKSON CHEN | | Part No. | | TBD | |
| Drawer | | YACHU CHEN | | Material | | TBD | |
| Designer | | YACHU CHEN | | Date | | 21-Mar-2008 | |
| Sheet | | 1 / 1 | | Scale | | 1:1 | |
| Mark | | CHI MEI | | Optoelectronics Corp. | | ALL RIGHTS RESERVED. COPYING FORBIDDEN | |

| Mark | Description | Date | Changed_By | Approved_By | ECN No. | Remark |
|------|-------------|------|------------|-------------|---------|--------|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |